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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/571,869	01/19/2007	Johann Riegel	10191/4215	6930

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EXAMINER	
DINH, BACH T	

ART UNIT	PAPER NUMBER
1724	

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09/27/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/571,869	RIEGEL ET AL.	
	Examiner	Art Unit	
	BACH DINH	1724	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 July 2011*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *10,16-18,21 and 22* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *10,16-18 and 21-22* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 07/21/2011 has been entered.

Summary

2. This is the response to the communication filed on 07/21/2011.

3. Claims 10, 12-14 and 16-22 are currently pending with claims 12-14 and 19-20 are withdrawn from consideration.

4. The application is not in condition for allowance.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Usami et al. (US 4,902,400) in view of Kondo et al. (US 4,472,262) and Harada et al. (US 4,915,814).

Addressing claim 10, Usami discloses a sensor element (figure 2) for a gas sensor for determining a concentration of a gas component in a gas mixture, comprising:

A pair of electrodes including a first electrode 8 and a second electrode 6;

A solid electrolyte 4 that forms, together with the first and second electrodes, a pump cell (7:41-47, the current flows through the pump cell represents the concentration of oxygen, 11:13-17);

A reference electrode 14 provided on the solid electrolyte and exposed to a reference gas (7:34-35, air);

A porous protective layer 41 for the first electrode 8,

Wherein the first electrode 8 is exposed to the gas mixture via the porous protective layer,

A porous diffusion layer 38 coated on a surface of the second electrode 6 facing away from the solid electrolyte (figure 2),

Wherein the porous diffusion layer 38 is directly exposed to the gas mixture (figure 2),

Wherein the solid electrolyte is part of a solid electrolyte body that includes a first solid electrolyte layer 4 and a second solid electrolyte layer 10, and wherein the first

electrode 8 and the second electrode 6 are situated vertically opposite sides of the first solid electrolyte layer, a clearance 16 exists between the second solid electrolyte layer 10 and the porous diffusion layer 38, and the clearance being exposed to the gas mixture via a gas supply orifice 50 that extends through the first solid electrolyte layer 4, and

Wherein the clearance adjoins the gas supply orifice (figure 2).

With regard to the limitations "wherein the first electrode forms, together with the reference electrode and the solid electrolyte, a concentration cell" and "wherein the second electrode is configured as a reference electrode of the concentration cell", which are drawn to the functions of the first, second and reference electrodes, the MPEP states "while features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function" and "a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from the prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim" (MPEP 2114). In instant situation, Usami discloses all three of the claimed electrodes; therefore, Usami discloses all the structural limitations of the electrodes of the claim. Hence, the manner in which the electrodes are employed does not differentiate the electrodes from that of Scheer for the first and reference electrodes of Scheer are structurally capable of forming the concentration cell and the second electrode is structurally capable of functioning as a reference electrode of the concentration cell. Usami is silent regarding the porous protective layer 41 is a coarsely porous diffusion layer and the porous diffusion layer 38 is a finely porous diffusion layer.

Kondo discloses a gas sensor comprises the electrodes 1d and 1b sandwiching a solid electrolyte layer 1a for measuring the current that is indicative of the oxygen concentration (figures 1A-1B) similar to the electrodes 41 and 42 sandwiching the solid electrolyte layer for measuring the current that is indicative of the oxygen concentration ([0023], the electrodes 41 and 42 form the pump cell, which measures the concentration of oxygen in term of the output current [0005]) as disclosed by Usami. Furthermore, the porous diffusion layer 1e that covers the upper electrode 1b has larger gas permeability than the porous diffusion layer 1f that covers the lower electrode 1e (col. 5 lines 2-12 or 5:2-12).

At the time of the invention, one with ordinary skill would have found it obvious to modify the gas sensor of Usami by modifying the porous protective layer 41 to have a higher gas permeability than the porous diffusion layer 38 as disclosed by Kondo for the layers 1e and 1f, respectively because by having higher gas permeability, the porous protective layer 41 allows oxygen gas to drain from the solid electrolyte layer through the electrode 8 and the porous diffusion layer 38 controls the quantity of oxygen gas diffuses to the solid electrolyte layer from the electrode 6 (Kondo, 5:3-12).

Harada discloses a gas sensor; wherein, the porous diffusion layer, which is made with particles with large mean particle size, has larger pores size then the porous diffusion layer made with particles with small mean particle size (5:37-45).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the porous diffusion layers of Usami in view of Kondo by forming the porous protective layer 41, which has higher gas permeability, with particles with large

mean particle size and the porous diffusion layer 38, which has smaller gas permeability, with particles having small mean particle size as disclosed by Harada because the porous protective layer 41, that has the particles having large mean particle size, would have large pore size and higher gas permeability than the porous diffusion layer 38 that has the particles having small mean particle size according to the relationship between mean particle size and the pores size disclosed by Harada (5:37-45). Therefore, the porous protective layer 41 with particles with large mean particle size is the coarsely porous diffusion layer and the porous diffusion layer 38 with small mean particle size is the finely porous diffusion layer.

8. Claims 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Usami et al. (US 4,902,400) in view of Kondo et al. (US 4,472,262) and Harada et al. (US 4,915,814) as applied to claim 15 above, and further in view of Fukuda et al. (US 4,808,293).

Addressing claims 16-17, Usami discloses the first solid electrolyte layer 4 is supported by a solid electrolyte layer disposed between the solid electrolyte layers 4 and 10 (figure 2).

Usami is silent regarding the solid electrolyte layer between the layers 4 and 10 is a radial web.

Fukuda discloses a gas sensor comprises a layer 2 in form of a radial web for supporting the top layer 3 and is disposed on the solid electrolyte layer 1 (figures 3-4).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the solid electrolyte layer of Usami with the radial web section as

disclosed by Fukuda because the radial web portion would increase the diffusion flow resistance; thereby, allowing the oxygen sensor to operate at a lower temperature (Fukuda, 4:21-25).

9. Claims 18 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Usami et al. (US 4,902,400) in view of Kondo et al. (US 4,472,262) and Harada et al. (US 4,915,814) as applied to claim 15 above, and further in view of Mase et al. (US 4,755,274).

Addressing claims 18 and 21, Usami, Kondo and Harada are silent regarding the finely porous diffusion layer is made up of a plurality of superposed diffusion layers of different porosities.

Mase discloses a porous diffusion layer (108b and 108a) covering an electrode (figure 21); wherein, the porous diffusion layer comprises a plurality of layers with different porosities (16:58-61).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the finely porous diffusion layer of Usami in view of Kondo and Harada with a plurality of superposed diffusion layers of different porosities as disclosed by Mase because the multiple superposed diffusion layers would increase the sharpness of detection of a variation in output or reducing the tendency of plugging or clogging (Mase, 15:52-16:5).

10. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Usami et al. (US 4,902,400) in view of Kondo et al. (US 4,472,262), Harada et al. (US 4,915,814) and Fukuda et

al. (US 4,808,293) as applied to claims 16-17 above, and further in view of Mase et al. (US 4,755,274).

Addressing claim 22, Usami, Kondo, Harada and Fukuda are silent regarding the finely porous diffusion layer is made up of a plurality of superposed diffusion layers of different porosities.

Mase discloses a porous diffusion layer (108b and 108a) covering an electrode (figure 21); wherein, the porous diffusion layer comprises a plurality of layers with different porosities (16:58-61).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the finely porous diffusion layer of Usami in view of Kondo, Harada and Fukuda with a plurality of superposed diffusion layers of different porosities as disclosed by Mase because the multiple superposed diffusion layers would increase the sharpness of detection of a variation in output or reducing the tendency of plugging or clogging (Mase, 15:52-16:5).

Response to Arguments

11. Applicant's arguments with respect to claims 10, 16-18 and 21-22 have been considered but are moot in view of the new ground(s) of rejection.

Usami is cited and relied on for the first time in this office action to show a gas sensor with the electrodes being covered by the porous diffusion layers as well as the clearance adjoins the gas supply orifice.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BACH DINH whose telephone number is (571)270-5118. The examiner can normally be reached on Monday-Friday EST 7:00 A.M-3:30 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Keith Hendricks can be reached on (571)272-1401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BD
09/14/2011

/Keith D. Hendricks/
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